

ABSTRACT

The object of the present invention is to increase the crystallization temperature of a hafnium compound film which can be effectively used as a high dielectric constant film of a gate oxide film of a MOSFET, for example. A hafnium silicate film is deposited on a substrate by reacting a vapor of a hafnium organic compound with a monosilane gas or a disilane gas in a reaction vessel in a heated vacuum atmosphere. Due to the crystallization restraining effect of silicon, the thus obtained film has a higher crystallization temperature. In another embodiment of the present invention, an oxygen-containing hafnium compound film is annealed in a heated ammonia gas atmosphere. The annealing also increase the crystallization temperature of the oxygen-containing hafnium compound film.